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Planned Research And Development

The problems and needs of a research and development planning department are not unlike those of a systems department. Increased attention focused upon systems work calls for improved planning procedures.

William L. Swager

▶ Much has been written in recent years about the need for planning business activities, with particular emphasis on long-range planning. Various procedures and mechanics for such planning have been devised, used, and publicized, but relatively little has been published on research and development planning. This paper deals with the need for such planning and suggests some useful procedures.

John Maynard Keynes wrote in his book, *The General Theory of Employment, Interest, and Money:*

> "Even apart from the instability due to speculation, there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation, whether moral or hedonistic or economic. Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits — of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities. Enterprise only pretends to itself to be mainly actuated by the statements in its own prospectus, however candid and sincere."

As a key member of the staff of Battelle Memorial Institute's Department of Economics, William L. Swager has participated in and directed numerous management and economic studies related to research and development. He is a graduate in chemical engineering of Purdue University.

Spontaneous optimism on the part of several individuals is often an important factor in the success of a new development. Oddly enough, this same spontaneous optimism pursued along other paths is also a major factor in failures, otherwise known as "backing a dead horse." The words of Keynes imply that spontaneous optimism is independent; that is, there is no way to prepare the "seed bed." It is the contention of the author that good planning creates the environment in which spontaneous optimism is nurtured, ordered, directed, and contagious.

The planning of research and development involves systematic procedures, intuitive if not mathematical assessment of expectations, and the allocation of money and effort. Sound planning procedures help bring essential issues and facts into focus, so that sound judgments can be made. Yet by far the most important result of the sound and systematic planning of research and development is not the final plan or allocation but the understanding, orientation, and direction that the plan gives to the creative minds throughout the organization. Or, put another way, methods and procedures and the resulting allocations are virtually worthless unless the intangible by-product of the process results in an environment that nurtures spontaneous optimism.

Better Planning Needed

Many technical people contend that research and development cannot be planned. To them the word "planned" involves intimate and detailed scheduling of single projects from an idea to a finished development. One must agree that a specific project can be planned only through certain steps; the direction of subsequent steps depending upon the results of initial ones. The detailed step-by-step direction of a project toward an agreed technical objective must be flexible and must be the prerogative of the technical man. This is not the kind of planning considered in this paper. The planning considered here deals with broader questions: How can we decide what projects to pursue? How can we formulate a program that will meet management's desires to improve business?

There is evidence that substantial improvements can be made in return for dollars spent for research and development. For example, one research administrator testifying before a House Committee reported his estimate of what he called "the efficiency of research." Admittedly, the output of research and hence efficiency is difficult to measure. What he tried to do was to assess the useful output in relation to the effort spent. His conclusion was that the efficiency of research today is about 15 per cent. According to him, the remaining 85 per cent consists of 10 per cent duplication of material previously prepared by others, 35 per cent wasted effort resulting from a lack of information, including inadequate knowledge of what is in the literature, and 40 per cent misdirected effort stemming from the lack of proper definition of goals or the lack of their proper understanding. Whether this man's estimate of the situation is precise is immaterial. Most would agree that he has identified the types of inefficiencies in research and development today and probably identified the general order of magnitude of these inefficiencies. The United States is spending this year about $10 billion on research and development. If the estimate just cited is approximately correct, we will have over $8 billion worth of research and development inefficiencies. Whether the exact figure is $6 or $8 billion is somewhat academic; the fact remains that there is considerable room for improvement.

The Role of Research and Development

Research and development planning must start with an understanding of the role of research and development in an industrial enterprise. In this country, its role is fundamentally to:

1. Enhance the possibilities of maintaining the profitability of present product lines and,
2. Provide an opportunity for new sources of profit

The two phrases used above, "enhance the possibilities of maintaining" and "provide the opportunity for" have important connotations. Research and development in and of itself *does not maintain* the profitability of present product lines *nor does it provide* new profits. The most far--reaching and profound research results are sterile in laboratory notebooks and reports. Until a company's marketing men can see ways to exploit the results, until the production department can devise means for incorporating them, until the financial committee can muster funds and justify the investment involved, they remain sterile. It is only after industrial management has translated the results into useful and marketable products and processes that a company realizes a "profit from research." In the last analysis the benefits to society from a particular scientific effort are not realized in the research lab; they are realized when the company undertaking that research makes a profit.

The whole organization contributes to the success or failure of research and development; the whole organization contributes to sound research development planning. *Information and judgment for sound planning come from all parts of the company.* The contributions of top management are extremely important. Top management's long-range plan is an essential foundation to any research and development planning. If long-range goals of management are not set forth formally in such a plan, some attempt to do so will be required before a sound program can be developed. Management's policies and its judgments provide over-all guide lines to the entire research and development organization and must be reflected in the plan. If these guide lines that only top management can give are hazy and fuzzy, some of the efforts of the research organization can be expected to be drained off on projects that are of little use to the company.

Just as important, but in a more detailed way, is the guidance given to research and development planning by sales management. The sales organization can provide market data, market estimates, prices, an understanding of customer's needs, and market judgments. All of these are essential to sound planning.

Production also makes an important contribution. Information on present methods and processes is important. Data on current costs give added guidance and finally, production people can contribute their judgment as to the practicality and producibility of anticipated developments.

A perhaps little recognized contribution to research and development planning is made by finance and accounting people. In far too many organizations the procedures for evaluating and comparing new products and new processes are antiquated and unfortunately at times misleading. The methods and procedures for calculating and presenting cash flows and profit projections on an anticipated consolidated basis would be most helpful to research and development planning. Some thought should also be given to developing a method for measuring and accounting for the truly productive output of research and development.

Although all parts of an organization contribute to the planning, it is obvious that the responsibility for such planning must rest with research and development management. This management is at the nerve center of a communications network and must look at its task of planning and coordinating in just such a manner.

Research and development has been likened to a game of stud poker. Every few months each company must place its bets. It has the opportunity to assess during each round the strength of each opponent's hand in relation to its own and to determine the worth of seeing the next card. The procedure outlined here in itself does not assure winning the game. It merely helps bring a mass of information into better perspective so that judgments and decisions can be reached consistent with the probable risks and gains.

Steps in Planning Research and Development

During the course of helping a number of companies and associations re-evaluate their programs of research and development, certain steps in planning have proved to be useful. Any company wishing to initiate or re-evaluate its own program should find these steps a useful guide.

Step I. Set Business Goals. It is important to have clearly implanted in the minds of the research and development people the ultimate goals of the company that can be partially or wholly satisfied through their efforts. A clear statement of these goals should be held up in front for all to see.

The business goals, protecting the profitability of present products and developing new sources of profit through new products, should be defined clearly and explicitly. Unless considerable effort is devoted to the clarification and communication of these business goals, a research program is likely to result in a number of technical answers which contribute little to the business.

Step II. Establish Technical Objectives. This step is the translation of the business goals into related technical objectives. The word "related" is important. Unfortunately, the way in which business and technical objectives are stated has an important bearing on the direction and usefulness of research effort. For example, a metals company might have stated as one of its technical objectives the development of a better furnace for remelting aluminum. This broad statement does not show a specific relationship to the real business problem at hand. It would have been much better to state the objective as follows: to design a furnace to reduce the cycle time. This statement recognizes that the cycle time has an important bearing on investment costs per ton of capacity. This statement gives direction. Progress toward this technical objective would result in specific progress toward a business goal — reducing the investment required for an expansion program.

Step III. Identify Technical Alternatives. This step of research planning might be called the idea stage — the starting point for so many research and development plans. If a search for ideas is oriented in the direction of certain explicit and well-defined business and technical objectives, one can expect a high proportion of the ideas to be consistent with the goals that have been established. If, on the other hand, business and technical objectives are loosely stated, or not stated at all, the technical ideas that are solicited from the research and development laboratory people are likely to be random and not necessarily oriented toward the objectives of the company.

For each of the technical objectives stated in Step II, there are usually several technical approaches. For example, much work was done on automobile finishes before the problem was sufficiently defined. When Kettering finally defined it: "to develop a finish that withstands ozone," substantial improvements were made. Once the technical objective was clearly and definitively stated, paths toward that objective could be identified:

(1) Development and incorporation of an anti-ozonant in the composition which would "capture" the ozone at the surface of the finish,

(2) Development of an ozone retardant, i.e., a material that would impede the formation of ozone, and,

(3) Development of ozone resistant compounds and materials for formulation into a finish.

Not all of the alternatives would be equally attractive from a technical point of view, but in order to make sure that all alternatives are at least considered, it is important to put them all down so that judgments can be rendered.

Step IV. Evaluate Alternatives. This step involves pulling together a great mass of information. As was indicated previously, this information is supplied from various parts of a company, top management, sales production, and accounting. The kinds of information might be grouped under four factors bearing on the desirability of undertaking research efforts. These are discussed below:

1. *Probability of Technical Success.* Some judgment must be made regarding the technical feasibility of each of the various approaches to an objective. In some cases there may be no evidence. In other cases, it may be possible to reason by analogy. In still other cases, preliminary research results may be available. It is important to recognize that technical people must make some kind of implicit or explicit judgment of the feasibility of undertaking a particular project before a decision can be reached as to its merits.

2. *Aggregate Costs and Investments.* Most research and development plans involve an estimate of the cost for the next step or phase of each project. Such estimates are important but insufficient. Exaggerating to make a point, it would have been foolish for the small XYZ Chemical Company to undertake a $50,000 research effort — well within its means — which was the initial step toward the development and commercialization of nylon. Such a company would not have been able to finance the millions of dollars of further research, development, engineering, plant investment, and sales promotion and market development needed before commercialization and profitability could be achieved.

Some effort must be made at the planning stage to anticipate at least the approximate aggregate costs and investments needed. Some educated guesses may be required, both technical and business, before such projections can be made. Nonetheless some attempt has to be made to look down the various paths far enough in order to help assess the relative worth of taking the next steps.

3. *Time Estimates.* Too little attention is given to the very important problem

of timing. Sales people know that market strategy, just like military strategy, requires well-timed maneuvers. The success or failure in terms of profit of a research and development program may hinge on timing. This means, then, that in addition to looking down the many paths and estimating the costs of going down each path, it is important to estimate the approximate time that will be required to complete research, development, engineering, and market development.

4. *Estimated Profit or Gain.* There is a definite need for accounting and financial people to establish and continually improve ground rules for making cost comparisons and profit projections, which are essential parts of research and development planning. In the estimates of profits or gains from research and development, market research is also an important tool. Estimates must be made of the potential markets for new or improved products and the market penetration that might be achieved. Of considerable importance at this stage is an appraisal of what competitors are doing or likely to do. Estimates of profit or gain should be related to previously established business goals. This will facilitate the over-all appraisal required when firming up a budget.

Step V. Budget. Some companies have found it convenient to use formulas in combining the various factors outlined in the evaluation step above. Although there is a certain amount of convenience in the use of such formulas, there is also a danger. There is a tendency to take an arbitrary rating scale as gospel, not recognizing the need for further judgment. None of the formulas reported in the literature provides any way automatically to give weight to the relative importance of the business goals involved.

A Bench Mark

The procedure for planning outlined here provides a way of establishing a bench mark of information and judgments. On the basis of this array of data, certain decisions can be made with respect to a future program. Unless this array of information is put together systematically, it is difficult to interpret the significance of any new information that may be gathered — there is no way then of knowing "which way to turn the valve" for the next period.

As Howard S. Turner stated in the *Harvard Business Review,* May, 1954, "Thus, to develop what is expected of research, management should state its aims in business terms and thereafter work out with its research executives the way it wishes research to serve these aims."

Conclusion

An attempt has been made here to point up the importance of management aims, to show the need for explicit statements of these aims, and to outline a set of procedures that will help formulate a research and development plan consistent with them. These procedures can help to stimulate an understanding of research and of its place in a company and to increase the value of its contribution to a company.

The planning of research and development, *like the planning of any other activity,* can be considered by some as an end in itself. The consequences of this are deadly. The stifling of creativity and of what Keynes called "spontaneous optimism" is assured. Planners and plans must recognize the overriding importance of maintaining an environment that will nurture creativity and spontaneous optimism. **s/p/a**

The Space—Time Analogy to Management Fundamentals

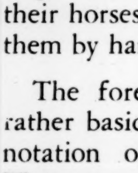
Organizations correspond to space, and methods correspond to time.

Jack Wright

▶ Management analysts of today tend to become slaves to methods and techniques in themselves and to lose sight of the real utility, applicability, and purpose of such methods and techniques. In brief, they lose their perspective. Often they become so preoccupied with the leaves that they even come to the conclusion that trees as such do not exist. It seems appropriate, therefore, to attempt to project a little philosophy about management itself. After all, detailed knowledge of procedures, methods, and specific techniques means very little if one does not have a proper over-all understanding of *when, where,* and *how* to apply them. Even more pertinent is an appreciation of WHY one applies them at all. So, let us consider that rather complex enigma which so many people glibly refer to as "management." What is management? What do we really mean by the term?

Derived from "manus," the Latin word for "hand," the word itself suggests that management relates to "handling"—leading by the hand, manipulating, directing, and controlling. Indeed this is pretty much what the Romans meant by the word "manage," although they applied it largely to horses; that is, they managed their horses. They directed and controlled them by hand.

The foregoing remarks suggest some rather basic elements in the modern connotation of our word "management." Thus, we might conclude that "management" relates to the *ability to exercise a rational constraint on what would otherwise be freedom of action.* The key phrases in this quasi-definition are "*rational* constraint" and "*freedom* of action," and the latter is the more significant in that it begets the need of desirability for the first. Unless there is a possibility of action — freedom of action — there is no possibility of applying manage-



Jack Wright is the author of several recent articles on management information systems and related subjects. A graduate of the U. S. Naval Academy and the USNA-PG School, Mr. Wright has been professionally associated with the Navy in ship design, operations, and fleet maintenance, as well as in management billets. He is currently Executive Officer of the Data Processing Systems Division of the Navy Management Office.

ment. On the other hand, constraints in themselves do not yet connote management. Constraints must be rational. They must be oriented to a proper objective.

In the broadest sense, we can distinguish two fundamental aspects of all actions. Any action can be considered as either *simultaneous* or *sequential* with respect to every other action. That is, two events can either occur simultaneously or one before the other. There is no third possibility.

The foregoing propositions lead us directly to a consideration of two basic and fundamentally distinctive aspects of all management; namely, *organizations* and *methods*. Thus, *"space" may be considered as a measure of things which exist concurrently or simultaneously, and "time" may be considered as a measure of things which exist successively or sequentially.*

Actions which occur simultaneously require organization; and actions which occur sequentially require methods, procedures, or schedules. Thus, organizations correspond to space, and methods correspond to time.

To clarify this a little, let's consider an individual man, a single "action agent." Now *a* man (except in rather limited and often humorous circumstances) can generally do only one thing at a time. Because of this, all of his actions may be categorized as "sequential." Thus, a given man does this, then that, then something else, and so on in endless sequence as long as he lives. Nevertheless, because of his capacity for freedom of action and his ability to exercise control over his sequence of actions, he can and should practice management, self-management, in the completest sense of the term. Therefore, every human being, within the limits imposed by external influences, is a manager. He is a manager of methods and of his own time.

Now, let us introduce our first man to another man and assign them one common responsibility. A very real difficulty arises immediately. They can both be acting at the same time, simultaneously, but they cannot both be driving the same nail with the same hammer in the same spot at the same time. We are now confronting the second aspect of management — organization. That is, we must *space* their actions. This simply means that we must carefully delineate specific *areas* of responsibility and distinct ranges of authority.

This, then, is what management is really all about. We wish to organize *collateral* efforts so as to provide direct lines of authority and specific areas of responsibility. Wasted *time* is an index to poor organization. It may show up in delays from waiting for authority to proceed, in delays from waiting for assignments, or in delays from misunderstandings as to responsibilities. Conversely, it may show up in duplication of effort. Further, within a given organization, we wish to provide specific methods or procedures to govern individual or collective *seqential* efforts of all incumbents. Again, wasted *time* is an index to poor methods. Here it may show up in delays occasioned by waiting for tools, materials, services, assist trades, and access.

In conclusion, it is suggested here that management analysts may profit from adopting a perspective that is oriented to the space-time analogy to organization and methods. It is suggested that the analyst consider the relationship of *time* to organization and methods objectives. In this way, it is hoped he may more readily determine the proper technique to apply in any given case. **s/p/a**

Integrated Communications

Build a simplifying process to cope

The responsibilities of management can be defined as leadership, control, and guidance of a group of individuals toward some common objective. This is true whether in government, single proprietorship, or a large corporation. This identifies management's purpose but fails to give us an insight into how it can be achieved. There are two areas of operation. First is the subject area identified by an organization chart. Second is the process area composed of the processes and responsibilities of a management group*. Generally, there are five basic processes:

1. *Planning:* determining what shall be done. This includes the clarification of objectives, establishment of policies, establishment of programs, and determination of specific methods and procedures that are to be followed in the course of a program.
2. *Organizing:* grouping the activities necessary to carry the plans into management units and defining the relationships among the executives and workers in units that are under control.
3. *Assembling resources:* obtaining the personnel, capital, facilities, and other things needed to execute the established plans.
4. *Directing:* issuing management directives. This includes the vital matter of indicating plans to those who are responsible for carrying them out.
5. *Controlling:* seeing that operating results conform as nearly as possible to the established plans. This involves the establishment of standards, motivation of people to achieve these standards, comparison of actual results against the predetermined standard, and the initiation of necessary corrective action when performance deviates from the plan.

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*See Figure 1, Page 12.

s Systems for Management

e with increasing complexities.

Norman J. Ream

In the past, management has tended to be compartmentalized. For example, salespeople talk about sales problems, industrial relations people talk about their problems, accounting people talk about their problems. Yet, as we look at the information that management uses, we find that the various "fields" use information derived from the same basic inputs, although perhaps in a different form.

Within the past few years we have had changes in management philosophy and consequently in the type of information needed. Years ago, management looked at the historical type of information. As budgeting techniques developed, they became more of a guide in projecting management activities. Today we have new tools and planning techniques contributing still further to a changing philosophy of management. There are two reasons for this. One is the increase in scope and complexity of modern-day business, and the second is our increasing development of knowledge about using the new tools — particularly the computor — which have been under develpment for many years.

Zay Jeffries said in an address at the Case Institute of Technology five years ago, "Our progress depends to a considerable extent upon seeing to it that the simplifying processes move forward in approximate balance with the complicating processes. If this can be accomplished,

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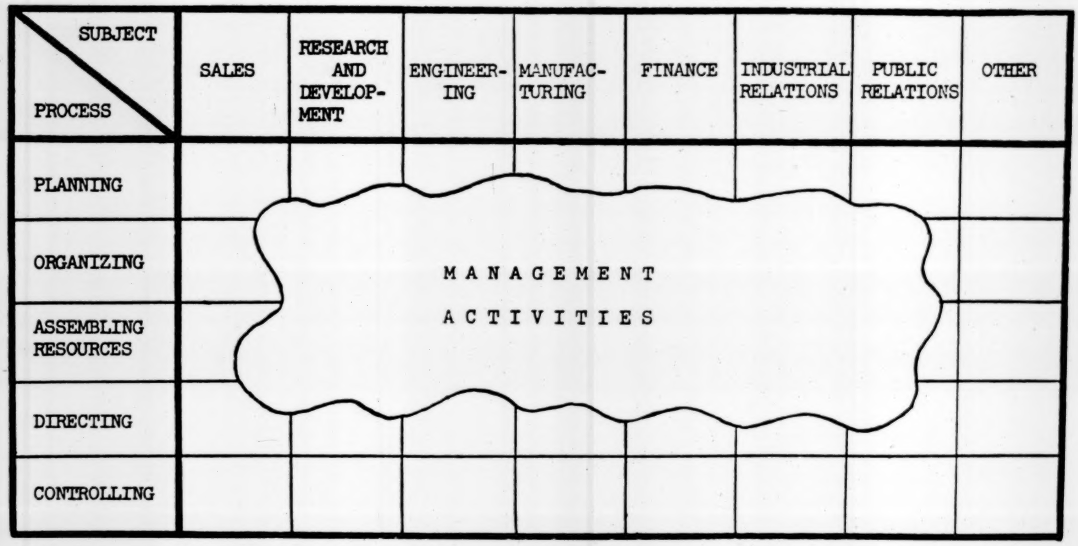
SUBJECT
PROCESS
SALES
RESEARCH AND DEVELOPMENT
ENGINEERING
MANUFACTURING
FINANCE
INDUSTRIAL RELATIONS
PUBLIC RELATIONS
OTHER
PLANNING
ORGANIZING
ASSEMBLING RESOURCES
DIRECTING
CONTROLLING
MANAGEMENT ACTIVITIES

CO-ORDINATION OF ACTIVITIES

Figure 1

then individuals with given ability can expect to go forward indefinitely without becoming casualties of their own complexity." This is one thing we failed to realize in business for many years. We kept building up the complexity of business but failed on the other side, especially in the data processing and communications area, to build a simplifying process so that we could cope with the complexities of business which had been developing through the years. Jeffries truly stated a basic problem of management.

Some Problems

In any discussion about an integrated approach to the problems of management, we must direct our attention to the problem of what information is required to operate a business in a co-ordinated and profitable manner.

Good communication aids in co-ordinating the activities of management. For instance, management must know promptly whether operations are proceeding in accordance with plans so that adjustments can be made when required. Moreover, there are a wide variety of activities, particularly detailed ones, which it is impractical to plan too far in advance. It is axiomatic that those directing and performing them should have current information upon which to base decisions. Management is awakening to the realization that a business is essentially controlled and directed on the basis of information supplied by its "data processing system." It is realizing that major policy evolves from day-to-day decisions which are based upon the information currently at hand. It is also awakening to the bare fact that much desirable information is not available.

In the development of an integrated approach to administrative systems areas we see five basic objectives:

1. Develop improved management intelligence for use in decision-making processes.
2. Reduce and control time spans
3. Improve accuracy
4. Increase productivity
5. Reduce costs of operation

None is new; all have been attempted before. But the advent of electronic data processing systems has thrown a new light on the old problems and given us an ability that we lacked before. The sheer weight of information kept us from taking a logical approach to developing this information.

In attempting to devise a planned administrative systems improvement program for Lockheed, we recognized that we could not achieve the desired results by merely studying and converting our existing systems and procedures. We were faced with a research problem of considerable magniture, and it could only be solved by an analysis of requirements based upon a knowledge of systems parameters. We had to solve this problem: How can we best take basic information from day-to-day operations and process and distribute it so as to maximize profits and minimize costs? The solution required a well-planned program, carried out by creative people acquainted with research methods. A basic requirement is to tie various segments of management into an effective whole through proper flow of information. It involves binding, through this flow of information, an entire organization into an effective, integrated whole, so that information pipe lines serve as a means of improving day-to-day operations and projected operations as well.

The most difficult part of any complicated problem, whether administrative or scientific, is to devise a clear statement of it and to establish a systematic pattern for proceeding. The administrative systems problem, being primarily concerned with the processing and flow of information, has three basic parts: (1) *Problem Formula.* Determine what basic inputs and what outputs of information are required. (2) *Logical Design.* Try to structure internal relationships which exist and describe information flows so that given inputs will produce the required outputs. (3) *Detailed Systems Design.* This part is concerned with the techniques and tools of the system, and spells out how operations required in the logical design are to be accomplished.

There is much work to be done before one can get down to equipment (hardware). One of the problems from which management suffers today in the application of computers is that too many people devise systems around the hardware rather than trying to devise systems which solve the problems of management. The three parts of an administrative systems problem must be attacked in proper sequence, although at times it is possible to work on Parts 2 and 3 at the same time. Again, I emphasize that the most difficult part is the proper formulation of the problem. Until this is accomplished, little can be achieved by attacking small segments of existing systems.

It is not necessary that each person working on the formulation of the problem or of the logical design have a detailed knowledge of existing systems such as accounting or manufacturing control. In fact, many times this is a handicap. The important requirement is an ability to use research techniques and to maintain an objective attitude which will not necessarily be influenced by existing systems or the existing thinking of management. The analysts may have the responsibility of changing managements' thinking, for in reality no management today can tell exactly what information it needs. The people doing research on this problem have the responsibility of bringing management that information which they think it needs. This can be accomplished without antagonism. It is partially a problem of cooperating with management and will involve some sales effort.

Our Problem

Our initial interest in an integrated systems approach at Lockheed resulted from early studies to develop any improvements that might be accomplished through electronic data processing systems. We started with our manufacturing control operations. Our system of manufacturing control had grown so complex that it was no longer a practical manual or punched-card operation. In fact it had come to a breaking point. Manufacturing control can be defined as a means used by management to obtain economical and coordinated operations in carrying out a planned production program. It includes planning of operational sequences, control of inventories, ordering, routing, scheduling, and dispatching, so that the minimum of material, performance of machines, and productivity of labor are controlled as to quantity, quality, cost, time, and place. The establishment of sound manufacturing control practices is an essential prerequisite in the operation of an adequate system of accounts, including cost and financial accounting, because while we think of production control as related only to materials, parts, and manhours, proper accounting obviously requires translation into dollars and cents for financial purposes. Many companies have started their studies of electronic data processing with payroll operations or in finance. We took an opposite tack. We had a real problem other than accounting. It was a physical problem of moving materials and of controlling materials throughout the plant. If we could solve it, we thought we could quite easily convert values into dollars. We did not anticipate this conversion as the first problem and we were right.

Our management found, as has been true of most managements, that it was handicapped in applying adequate manufacturing control techniques because of the terrific amount of clerical effort required to maintain the desired system. In fact, manually it was an impossible task. Clerical problems were not so pronounced during the development of the initial prodution control schedules, but they increased when engineering modifications and changes in anticipated production levels necessitated revisions in original schedules. Failure to revise production schedules to reflect frequent changes caused production control operations to deteriorate into nothing more than a glorified expediting operation. In other words, we lost control after we established the original schedules. However, the use of electronic data processing equipment, the application of advanced computational techniques, and the use of more modern communication techniques, make possible a degree of manufacturing control vastly greater than had been possible before. And we were fortunate because we had an IBM 704 in our California Division operations for scientific purposes so we were able to work with the machine itself from almost the beginning. The introduction of electronic data processing systems really forced our management to become aware of the need for integrated systems.

The airframe industry in general must cope with two important characteristics:

(1) An extended production lead time (up to 10 years from concept of a plane to flight for complicated airplanes), and (2) an extremely dynamic technological rate of advance (one which has been greater in the past five years than in the entire history of man's effort to conquer space). It is under strong pressure to cut down lead time and under extreme pressure to speed up technological advance. At Lockheed we are determined to accomplish both, and one basic requirement was the major overhaul of our data processing. Also, in order to capture our share of the market, management is under constant pressure to reduce costs. And, the acceleration and deceleration of production schedules has explosive effects upon all segments of the industry. For example, when the Air Force cut back in 1957, we had to change our schedules. These factors create terrific problems in the manufacturing control and finance areas. However, we have to cope with them.

The manufacturing control function has as its "input" data the following information: (1) from Design Engineering concerning part requirements; (2) from Project Planning concerning the manufacture of parts; (They decide whether parts will be manufactured or purchased.) (3) from Production Scheduling concerning the scheduling of parts; (4) from Accounting and Production Control concerning the quantities of airplanes to be manufactured with their groupings by cost lots; (5) from Spare Parts concerning spares requirements; (6) from Material on raw materials, purchased parts, and economic order quantities; and (7) from the shop concerning the filling of orders — a type of feed-back information. "Output" to planning consists of master parts lists, reconciliations of manufacturing assembly parts lists, and the engineering assembly parts lists; to direct hours, a standard hours forecast; to scheduling, detailed manufacturing schedules; to material, perpetual material inventory records, bills of material, requests to purchase and other material reports. We will also "output" information concerning from whom to purchase and about costs of items. We will eliminate clerical vendor files where this information is now kept.

"Output" to accounting consists of the various reports necessary for financial control over our manufacturing operations; to production control, periodic shop orders, continuous production orders, purchased parts requisitions, disbursement lists (disbursements from inventory to the line; we consolidate shop orders periodically into a disbursements list which has eliminated some 200 stock boys), and labor realization reports; to tooling, various tooling reports; and to engineering, various drawing and technical lists.

It appears that we will probably develop about thirty-six major magnetic tape files for use in this planned system. Eight of these will be produced from paper tape or punched cards containing information captured at the source, 4 will result from information transcribed onto magnetic tape as a separate operation, and 24 will be generated internally within the system, from information already captured. In other words, the system will make repetitive use of data which in a manual system necessitates transcribing it many times from record to record.

We are working in four other areas: (1) The manufacturing order control system, (2) base schedules for manufacturing, (3) direct man-hour forecast, and (4) inventory control.

Order Control. The order control system has as a goal the issuing of both production and spare-parts shop orders. Approximately 280,000 parts are listed on magnetic tape in this operation. We also have complete engineering releases, in tape form, for all models. These tapes are in effect punched from engineering drawings and identify the part number, the assembly on which it is used, the number of times the part is used on that assembly, the type of part (whether fabricated, purchased, or an assembly), and the first and last airplane on which the part is used. These tapes are "input" for computing the quantity of parts to be ordered. The planning information necessary to schedule and order a part is transmitted from the Scheduling Department to the data processing department. This includes such things as the line position in which a part is to be used, the number of days required to build it, and the type of manufacture. In addition, it gives the date that each airplane is scheduled to move into each line position. Cost Accounting provides the charges to be made and Production Control through the Spares Division transmits the quantity of spares to be ordered. It also identifies the activity of the part such as closure of orders, quantity closed, rejections, scraps, and lost parts. With all this information, which is then put on tape, it is possible to process a complete activity control system. The part numbers are in sequence on the main tapes and all changes are put in sequence before updating the main file. As a result, engineering, manufacturing, inventory, and planning information are all treated simultaneously in the same scheduling operation.

The main file consists of approximately 30 individual magnetic tapes and each part number consists of approximately 2,000 digits of information; the minimum is about 300 digits and the maximum 4,500. The machine instructions required to perform this operation involve approximately 16,000 steps. The conversion of this operation to an electronic data processing system prevented a breakdown of the system and saved $180,000 a year in direct costs.

Base Schedule. The smallest application currently on electronic data processing is the *base schedule,* which identifies the day on which each airplane and its major components will go through each line position. Data such as the production rate of the airplane, the number of positions in the line, and the date the first airplane enters the first position are given to us by the Scheduling Department. Every airplane is then calculated through every position on the line for as far in the future as there are airplanes to build. These base schedules require about 4,000 pages for all models. Approximately 300 copies are reproduced and distributed throughout the Division. From past experience, it can be predicted that approximately 4 complete revisions will be published annually. This gives some idea of the complexity of our base schedules.

Man-Hour Forecast. We prepare, by weeks, a quarterly direct man-hours forecast of direct fabrication, sub-assembly, continuous production, and outside production hours for a period of six months into the future and for each cost center and department. If specialized equipment is involved, we estimate what the load will be for 6 months, based on the schedule.

Material. We are trying not only to integrate our data and get better information but also to shorten time-spans. We now write production orders 6 weeks — 30 working days, 42 calendar days — ahead of the actual start date. All material requirements are thus scheduled considerably ahead of need. We hope to reduce order writing to an 8- or 10-day basis which will also pull in material requirements. This will mean less inventory on hand, less invested in inventory, and less rejection of items due to engineering changes.

Management and an Integrated System

The work of various members of management is divided into specialized fields, such as sales, research and development, engineering, manufacturing, finance, industrial relations, and public relations. Each of these may in turn be divided into the five basic processes of management which I mentioned earlier in this article. For example, the vice president of engineering must plan, organize, assemble resources, direct, and control in the same manner as any other member of management. Management problems may differ in degree, but they are interrelated and interdependent with problems of other management echelons.

In the past, most discussions concerning management problems have concentrated on such areas as finance and public relations. For the most part, attempts to establish, clarify, and develop an answer to the problems of management have been directed into narrower channels. More recently considerable attention has been directed to the development of an integrated approach to the problems of management. To my knowledge, no company has to date developed a fully integrated approach to the problems of management. The reason is, no doubt, obvious to all of us, for when we speak of this approach, we are faced with a problem of analyzing and then developing a means of measuring and controlling a complex assortment of interacting groups of variously motivated entities in a flux of decision-making situations that comprise the normal company. The degree of the complexity involved is usually in direct proportion to the size of the organization.

Management is realizing that it is much simpler to set down the logic of a problem in physical science than it is to set down the assumed logic that a business executive uses when he is making a decision based on incomplete data. So, the communication of essential information within a company is paramount in developing an integrated approach to management problems.

None of these basic objectives is new, but the advent of electronic data processing systems has given new life to the whole area. We are now seeking, and will continue to seek, the proper application of integrated data processing devices to take full advantage of interrelationships between the data problems of various segments of management and to recognize appropriately the dependence of a number of these segments on the same basic "input" information.

One of the principal problems involved in planning an integrated system is to get the input information into machine language at the earliest possible juncture in an operating procedure so that the principles of automatic perpetuation of repetitive data may be employed. Our efforts, therefore, have centered around the over-all integration of the recording of data, the communication of data, and computing and reporting requirements. Although the basic types of input are relatively few, the impact of volume and the need for a means of communicating these to our data processing center is a major problem. We initially determined that there were about 21 different types of input into our system and that approximately 10 could be captured at the source. Others must be translated into machine language as a separate operation. Fortunately this latter group does not represent the bulk of our input media.

s/p/a

Work Simplification, A Precis

W. D. Clarke

▶ Work simplification, an organized use of common sense, aims to find easier and better ways of doing work. This is nothing new. The first wheel, the first plow, the first sail, are all examples of old applications of work simplification. The idea and results of work simplification are, however, very important to us and our economy today because they help to make our work easier and better. Work simplification helps us make a better product, one that can be sold at a lower cost, and that gives better service as well. A better product at lower cost means more customers and more sales. More sales make more and better jobs. Work simplification makes improvements by:

(1) Eliminating unnecessary parts of a job

(2) Combining or re-arranging other parts of the job so that improvements result

(3) Simplifying the necessary parts of the job

Parts of the underlying philosophy or procedure of work simplification are (1) difficult problems can be reduced to simple steps and (2) Management can directly control efficiency by training each individual employee in that part of the procedure that applies to his work, and by making him responsible for being continually alert for possible improvements. To accomplish this, the five-step work simplification pattern is followed:

(a) Pick a job to be improved
(b) For best analysis, break down the job into its component parts
(c) Challenge the job and then each one of its component parts

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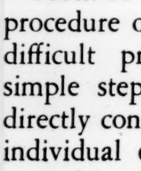

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(d) Develop a new method
(e) Apply the new method

In challenging each job, the key question to be asked is *why.* The entire job must, of course, be approached with an open mind. Study it without bias or prejudice. Just because a job is done a certain way doesn't mean that is the best way. Just because a job is being done does not mean it is necessary.

Other questions to be asked when challenging a job are *what, where, when, who,* and *how.* For example,

(1) *What* is done? *Why* is it done at all?
(2) *Where* is it done? *Why* is it done there? *Where* should it be done?
(3) *When* is it done? *Why* is it done then? *When* should it be done?
(4) *Who* does it? *Why* does this person do it? *Who* should do it?
(5) *How* is it done? *Why* is it done this way? *How* should it be done?

When challenging a job, deal with facts, not opinions; causes, not effects; reasons, not excuses.

A Better Way

There is always supposed to be a better way. One of the purposes of a program of work simplification is to encourage employees to seek this better way and to apply it to their daily work. In developing such an approach it should be remembered that employees are not always interested in obtaining a smoother running office or in breaking a bottleneck, particularly if they are not directly involved. They are, however, interested in eliminating some of their own problems and in making their own work easier. Work simplification programs that allow for active participation and that show specific and recognized results among employees are most likely to be successful.

A Program

The term "work simplification program" may produce a different picture in the minds of different people. Any consistent approach to the job of making work simpler and more efficient can rightly be considered a work simplification *program.* A *program* is generally defined as a course of action planned and approved before it is launched. In many companies today, simplification has become a program that is carefully designed to educate employees in (1) the principles of work simplification, (2) the benefits to be gained from applying them daily, (3) the systematic follow-up to encourage employees to apply those principles continuously, and (4) the type of recognition employees receive for their efforts. Work simplification programs are equally successful in the factory or office, although generally speaking, the factory is probably ahead of the office in the application of work simplification techniques.

Early Development

The development of work simplification can be traced back to initial experiments with time and motion study by Frederick Winslow Taylor and Frank and Lillian Gilbreth. In fact, work simplification, as we know it today, can very well be considered an offshoot or by-product of time and motion studies. It is generally agreed that the founder of time study was Frederick Taylor, but industry owes a great debt, as well, to Frank and Lillian Gilbreth for pioneering work performed by them in motion study.

After motion and time studies had become fairly well recognized and understood, many followers were attracted to this new application of scientific management. Some, however, professed to see fundamental differences in the procedures developed by the Gilbreths and Mr. Taylor and two groups of practioners emerged: the time study group and the motion study group. At length though, as each group became better acquainted with the work of the other, their differences were dropped and the best features of both were combined. To some extent, Taylor concentrated on establishing standards as a means of measuring a day's output and thus providing the incentive of known output. The Gilbreths, on the other hand, improved output by devising better and more efficient methods. By the middle 30's, then, several of the leaders in the field of scientific management including Allen Mogensen, Professor Irwin H. Schell of Massachusetts Institute of Technology, Dr. Lillian Gilbreth, and Professor David B. Porter of New York University, recognizing the importance of cooperation, combined the fundamentals of the techniques of motion study with a philosophy of management and called it *Work Simplification.* Having repeatedly developed and installed better patterns, only to find that people tended to revert to the old ones, these pioneers further concentrated on means of gaining acceptance of better methods. The idea of getting the individual into the act to eliminate waste and of getting understanding and acceptance through participation, gradually evolved and was practiced so that an employee would "buy" his own ideas more enthusiastically and make them work.

Present Status

The name of Allen H. Mogensen stands out prominently among those responsible for promoting work simplification as it is generally known and practiced today. Based on his work and that of others throughout the country, certain principles of work simplification are now taught by universities in the United States, and various types of clerical work simplification programs have evolved in business which usually make provision for:

(1) Training employees
(2) Evaluating and implementing proposals
(3) Following up employee participation

Probably the most common types of programs dealing specifically with work simplification as described here are:

1. The locally administered program in which each component of a company administers its own work simplification after representatives of these components have been centrally trained in the over-all theory.
2. The centrally controlled program in which each component does its own training and administration, usually by operating supervision, under the guidance of a central group.
3. The centrally administered program in which the training and administration for all components of a company are done centrally.

There are, of course, many variations and combinations of the foregoing types of programs. Since it is impractical to attempt to describe all of them, only the operation of a typical centrally administered program will be discussed here.

Centrally Administered Program

The first step in developing a centrally administered work simplification program is to appoint a supervisor who has been adequately trained for the job. Since a program is ordinarily only one part of an over-all systems and procedures program, the work simplification supervisor should report to the systems and procedures manager. He should have one or more work simplification analysts assisting him, depending upon the size of the company. The main duty of such a supervisor is to promote and process employee proposals for reducing costs and increasing efficiency. An important feature of this promotion is to teach the principles of work simplification to employees at regularly scheduled meetings which are usually spread over several weeks. The materials used at these meetings have become pretty well formalized or standardized but can be modified to suit the particular requirements of a company. They are likely to include such items as:

1. An explanation of work simplification and how it affects the employee as well as the company and the customer.
2. A discussion of the human relations aspect of work simplification; the natural tendency to resist new ideas or change and to resent criticism.
3. An example of work simplification in practice by having participants experiment with various gadgets such as the peg board.
4. An explanation of various types of procedure charts and actual participation in the preparation of such charts.
5. The basic principles of motion study.

Work simplification films are shown and discussed. Some are professional films while others may be developed by the company's work simplification staff to depict "before and after" stages of local procedures.

To be successful, ,a program must not be treated as a Roman candle sputtering into brilliance and dying out in a trail of smoke. There must be *continuous* follow-up and assistance to employees in selling, processing, and implementing their ideas. Continuing interest of employees may be stimulated by various means such as personal contacts, distribution of work simplification plaques, and literature and publicity in the company house organ. Work simplification proposals are solicited by the work simplification analysts, by cost-conscious operating supervision, and by top management in periodic memoranda. Proposals are submitted to a central work simplification group for screening, recording, estimating savings, and obtaining final approval. Even though employees often do not receive a monetary award for their suggestions, they must receive some form of recognition such as a personal letter from a member of top management. They must be aware that their active participation in the program may have a bearing on future salary increases and promotions.

It is desirable that the work simplification supervisor issue a monthly report to management showing the number of proposals and resultant dollar savings effected during the month by each component. This report stimulates competition and provides an indication of the cost reduction efforts made through the application of work simplification principles. Some studies have indicated the ratio of savings to cost of conducting the program to be approximately 4 to 1 in a given year. It must be remembered, however, that the savings effected in any one year often continue year after year, whereas the cost of carrying on the program for that particular year ends, of course, at the close of that year. Because the savings effected in one year may continue indefinitely, the ratio of savings to cost increases each year. It should also be recognized, that the greatest savings from a good work simplification program may not be recorded but may be reflected in the day-to-day attitude and work of employees who have been trained to question the details of what they do and to strive continuously for better — easier — ways to perform.

We have all read articles and listened to speeches by persons responsible for such programs as clerical quality control, clerical work measurement, and operations research, who feel that their particular technique is the one thing which will ensure a sound economic future for their particular business and, indeed, for business as a whole. This feeling stems in part from the fact that in order to pursue sucessfully any of these techniques, it is first necessary to record in detail what is presently being done. And in the process of so doing, inefficiencies automatically come to light and may be corrected. However, each of these programs, including work simplification, is only part of a sound over-all systems and procedures program. It is, therefore, not intended to infer that a work simplification program such as has been described here is in itself a cure-all for management problems. If properly administered and properly supported by top management, though, it is a vital part of the means to improve clerical efficiency. **s/p/a**

INSERTING A NUMBER IN A SERIES

It is sometimes desirable, for reasons of physical security alone, to number serially the sheets in a loose-leaf record or in a set of papers. Later on it may be necessary to insert an additional sheet between the two that are already numbered. In such cases it is not sufficient merely to give the new sheet the number, followed by the letter "a," of the sheet immediately preceding it, for if it is extracted its loss will not be noticed. The difficulty can be overcome by inserting also on the preceding paper a letter "a" *before* the number. For example, for a sheet inserted between sheets 5 and 6, the new numbering would read "4, a5, 5a, 6."

The

Reasoning is a

▶ Logic is used by all of us, in most of our activities. In particular it is used in work on Systems and Procedures. Most of our use of logic is casual and not formulated very explicitly. In my opinion our use of logic would be more effective if it were more *deliberate* and self-conscious. We can be helped in this direction by coming to a clearer awareness of what logic is.

To explain what logic is, and what logicians do, it is helpful to begin with some remarks on the topic of reasoning. "The object of reasoning," according to Charles Peirce, one of the greatest of American logicians and philosophers, "is to find out, from the consideration of what we already know, something else which we do not know. Consequently, reasoning is good if it be such as to give a true conclusion from true premises, and not otherwise. Thus, the question of its validity is purely one of fact and not of thinking."

Yet reasoning is a psychological process, and as such is studied by the psychologist as well as by the logician. Psychologists tell us that the reasoning process is extremely complex, often highly emotional, consisting of awkward trials and errors illuminated by sudden — and

Logical Approach

logical and a psychological process.

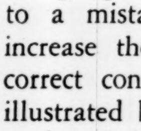
Irving M. Copi, Ph.D.

sometimes apparently irrelevant — flashes of insight. These are all of importance to the psychologist. But the logician is not concerned with the dark ways by which the mind arrives at its conclusions in the actual process of reasoning. The logician is more interested in the product than the process. He is interested in discovering whether the conclusion inferred from a given set of premises really follows from those premises or only seems to follow. All of the logician's special techniques and methods have been developed primarily for the purpose of making this distinction clear and of facilitating the division of arguments into correct and incorrect.

The Process

Nevertheless logicians have paid some attention to the process of reasoning. Their interest in doing so has been primarily to discover if there is any significant correlation between the way the process occurs and the quality of the product in which the process terminates. A traditional part of the study of logic is the treatment of *fallacies,* which are arguments in which from a given set of premises a conclusion is inferred which does not really follow from those premises. In their study of fallacious arguments, logicians have been led to the conclusion that a widespread source of error in reasoning is the unclear, vague, and ambiguous language in which the premises may be set forth.

The use of unclear language in formulating a problem need not lead necessarily to a mistaken conclusion, but it can increase the difficulty of arriving at a correct conclusion. This danger can be illustrated by a familiar riddle: "In my pocket I have two coins whose value totals fifty-five cents. One of these coins is not a nickel. What are the two coins?" Many people are misled by the language used, and spend time vainly trying to find some combination of two pennies, dimes, quarters, or half dollars which add up to fifty-five cents. The language *is* misleading, and that is the whole point of the riddle. A natural tendency is to understand the second premise as saying that *neither* of the two coins is a nickel. But



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alternatively it can mean that not both of the two coins are nickels, and only on this second interpretation is the problem susceptible of solution. The ambiguous formulation of the problem in this case can lead to delay in its solution; in other cases the delay can be more serious; and in still other cases unclear language can prevent the reasoner from arriving at any solution at all.

Another obstacle to the successful solution of problems is failure to ask the right question. This too can be illustrated by means of a familiar riddle: "Three salesmen checked into a hotel room, and each gave the bellboy a $10 bill to pay the desk clerk for his share of the room. When the bellboy gave the $30 to the clerk he was told that the room cost only $25 and was given $5 change to return to the guests. To simplify the problem of dividing this change among the three guests, the bellboy simply pocketed $2 and returned just $1 to each guest. Since each salesman received $1 change from his $10 bill, each paid $9 for his third of the room. Together, then, they paid $27 for the room. Two dollars went into the bellboy's pocket, bringing the total to $29 dollars. But originally they gave the bellboy $30. What happened to the other dollar?" This riddle fools no one very long. But in other circumstances asking the wrong question, or misformulating a real problem, can prevent a satisfactory solution from being found at all. In an office, the real problem may be to route information efficiently. If the supervisor makes the mistake of asking how *more* information can be processed, the original and real problem may go unsolved. A businessman may have the real problem of cutting down on his production costs. If he mistakenly formulates the problem by asking how to increase his volume, he may well fail completely to solve his real problem.

Validity

Some arguments are extremely simple in form, and for many such arguments it is intuitively obvious whether they are valid or invalid. No one would be likely to doubt the correctness of a reasoner who inferred that *Socrates is mortal* from premises stating that *all men are mortal* and *Socrates is a man.* Nor would any one be likely to infer that *all cats and dogs* from premises stating that *all cats are animals* and *all dogs are animals.* Logicians have devised simple mechanical tests for deciding the validity or invalidity of arguments of this sort. In saying that such tests are mechanical more is meant than that it would be theoretically possible to devise a machine that could make the decision. Machines for such purposes have already been designed and actually built. And more recently programs have been written for making an ordinary digital computer decide the validity or invalidity of such arguments.

Other arguments are more complicated, and partly through their very complexity offer more room for the reasoner to go wrong. This kind of case can be illustrated by still another riddle: "Of three prisoners in a certain jail, one had normal vision, the second had only one eye, and the third was totally blind. All were of at least average intelligence. The jailer told the prisoners that from three white hats and two red hats he would select three and put them on the prisoners' heads. Each was prevented from seeing what color hat was placed on his own head. They were brought together, and the jailer offered freedom to the prisoner with normal vision if he could tell what color hat was on his head. The prisoner confessed that he couldn't tell. Next the jailer offered freedom to the prisoner with only one eye if he could tell what color hat was on his head. The second prisoner confessed that he couldn't tell. The jailer did not bother making the offer to the blind prisoner, but agreed to extend the same terms to him when he made the request. The blind prisoner then smiled broadly and said:

> "I do not need to have my sight;
> From what my friends with eyes have said,
> I clearly see my hat is________!"

Perhaps one might jump immediately to the correct solution, but to convince another person of the correctness of his answer he would have to proceed in a step-wise fashion. He might begin as follows: the blind man and the one-eyed man cannot both have on red hats, for if they did the man with normal vision would have seen two red hats and would have known his hat to be white, which he did not. And he might continue: the blind man and the man with normal vision cannot both have on red hats, for if they did the one-eyed man would have seen two red hats and would have known his hat to be white, which he did not. Finally he would conclude: nor could the blind man have on a red hat and the others both have on white hats, for then the one-eyed man would see the red hat on the blind man and would know that he could not have on a red hat too or the man with normal vision would have known the color of his hat. An argument setting forth the extended reasoning used in solving such complicated problems as this one can be compared to a chain, whose several links are the smaller arguments or sub-arguments dealing with particular steps in the process. For the reasoning to be correct, for the chain really to lead from the premises to the conclusion, two conditions must be satisfied. First, each of the several links must be intact, each of the sub-arguments must be valid. And second, the links must really interconnect with each other to form an unbroken chain leading from the statement of the problem to its solution. This example serves to illustrate two of the rules that the great French philosopher Descartes, the "father of modern philosophy," laid down to guide his own thinking. These were "to divide each of the difficulties which I encountered into as many parts as possible, as might be required for an easier solution," and "to make enumerations so complete, and reviews so general, that I was certain that nothing was omitted."

Conclusion

I would like to conclude with a remark about teamwork in problem solving. What I have to say is obvious, and yet is often ignored and violated in much current research and development investigation. It is that the separate parts of a problem cannot safely be distributed among different persons for solution unless the whole is integrated by one person before the investigation is complete. The reason for this warning is that premises often have a fertility in combination that they do not have separately. For example, if Mr. A knows that Jones took the four o'clock plane for New York and Mr. B knows that the four o'clock plane for New York crashed with all aboard dying in the wreckage, then *neither* of them knows the fate suffered by Jones. Premises must be brought together in the mind of a single person before conclusions can validly be drawn from them. This shows in part the advantage of teamwork: the information of several persons can be pooled to provide new information. But I hope it also shows a possible danger: unless the information possessed by the several members of a team can be pooled or integrated in one mind, new information may simply not be forthcoming.

s/p/a

Advertising and Systems

Tracing a parallel development reveals a mutual need.

John V. Doyle

The modern advertising agency, if it is equipped to do all that it should, is a complex thing. Its activities include many which were not contemplated just a few years ago. As a matter of fact, even now there are some voices in the business which ask: "How did we get where we are, and what are we doing here?" My company, for example, is recognized today as a total marketing center as well as an advertising agency. The story of how an advertising agency became a marketing center is an interesting one to consider.

Before 1800, the average advertiser had no advertising problems. The town baker, cobbler, or tavern keeper had little competition. Selling the townspeople was simply a matter of telling them where he was located and what he had to sell. To help get his message across, he used such media as were then available. That is, he could hang out a sign which was his own outdoor advertising on an unorganized, localized level. He could buy space in the town periodical. He could even buy 8-second spots from the local broadcast medium — the town crier. But after 1800, when the advertiser tried to take advantage of improved transportation to expand his distribution into new markets, advertising became a problem. He couldn't spend his time traveling to place ads in the new markets. He didn't even know which towns had advertising media available, or what kinds. So, the two-way advertising relationship — the advertiser and his media — became a triangle. The third man was the space-jobber who traveled from town to town representing newspapers and magazines. He worked for and was paid, by these media. Present-day systems of "agency" compensation are rooted in this early relationship.

The Space-Jobber . . .

The space-jobber, who started perhaps on the payroll of a single publication, in time detached himself to take on additional publications. He made his money

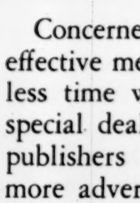
ADVERTISING

Are you working on your image?

SYSTEMS

selling space *for* publishers, who were glad to get extra income from out-of-town advertisers — and *to* advertisers, who were glad to be able to reach out-of-town markets. In many cases, the publisher and the advertiser paid too much. The space-jobber, as one history book puts it, "practiced the principle of getting from the advertiser all that he could be induced to pay and offering to the publisher as little as he would consent to accept." One space-jobber boasted of placing $2,000 worth of advertising for $600. In effect, he was taking a 70 per cent commission from the media involved. Fortunately, competition arose then, as it usually does. The space-jobber (he now prefers to be called an "agent") competed for business on the basis of his over-all knowledge of media. He compiled lists and files of available space on a national scale. The most successful agents had the longest lists. They were better able to pinpoint markets for potential advertisers.

Concerned now with making more effective media selections, the agent spent less time wrangling with publishers for special deals and discounts. And because publishers had more agents calling on more advertisers, and because these publishers were growing more aware of what their publications could do for advertisers, they could afford to, and did, stop offering special deals or discounts. Media rates and the agent's commission became standardized. Considering what the agent had to do at that particular time, it must have been decided that a 15 per cent commission was pretty good compensation.



John V. Doyle, Account Supervisor, Campbell-Ewald Company, advertising agency, was employed by the New York Office, in 1952 as a copy writer and later assigned to account management duties. His transfer to the Home Office in Detroit came in August 1957, where he took over supervision of the newly acquired Kroger chain store account. At present he is working in the area of corporate advertising for Campbell-Ewald clients.

. . . Becomes an Advertising Agent

This paved the way, in about 1875, for the space agent to do an about-face and become an advertising agent. Instead of *selling* space for the publications, the ad agent began *buying* space for the advertiser. He solicited his advertiser accounts; won and held them on the basis of his creative buying abilities, his knowledge of media, and his fair business practices. The advertisers he represented became his clients, and everybody benefited. Better publications began to get better shares of advertising budgets. Advertisers began to get better *results* from their advertising budgets, and the business of advertising really started to grow. (It may have been about this time that someone started to develop systems and procedures which would facilitate the ad agent's operations, since they were beginning to get just a little involved.)

. . . Who Gains Momentum

The advertising business gained momentum from the passage of the Preferential Postage Act of 1879, which for the first time allowed national distribution of magazines and, in effect, created *national* advertising.

The advertising trio of advertiser, ad agent, and media was now a mutually interdependent relationship. Every time a publication improved its editorial pages or increased its circulation, every time a poster organization improved its locations and its standards, it became easier for the ad agent to sell his clients more space. And every time an advertiser bought more space, he sold more products and made more money available for advertising. It must have been about this time that the agency business first earned its reputation for being glamorous, exciting, and exceptionally rewarding.

When the word got around, many new people got into the act and competition among advertising agents stiffened. The result was that in order to hold his clients, an agent had to offer services over and above the basic and primary functions of space selection and buying. For example, copy and art for the advertisements had been furnished or prepared by the advertisers themselves up to the late 1800's — sometimes with the help of publishers. Then some enterprising agent said to his clients, "Let me help you with that," and threw in preparation of copy and layout as an extra. This was easy for him to do. In those days $15 a week bought a hack writer or a layout artist. But, this little extra service became almost over-night a big extra service. It caused, in fact, a revolution in advertising. For as the writers and artists began to compete for the newly created positions on agency staffs, *their* products improved. And agents were able to show their clients entirely new approaches for presenting their products to people, both in words and in pictures. Before that time, the vast majority of ads had been simply printed announcements featuring a manufacturer's name, a list of his products, and his address. Ads prepared by the manufacturer himself, when illustrated at all, often showed a picture of the plant or of the company president. A manufacturer is understandably proud of these things, but working as he was in his own self-centered world, he had left someone pretty important out of his ads — the customer.

It was only logical that the advertising agent and his newly acquired creative staff would *discover* the consumer and the magical word "YOU." For example, consider the Pianola ad that reads, "*You* have a soul for music. But *your* soul, developed under Paderewski's personal instruction by means of the metrostyle of the Pianola Player-Piano, will make *you* a far better musician than *you* can ever hope to be, without this instruction." The creative agent learned how to romanticize a product and how to turn a Steinway Piano into a Steinway instrument of the immortals, even if it meant finding a professional model that looked like Franz Liszt and photographing him in filtered sunlight. Such creativity, thrown in as an *extra* service by Steinway's agent, sold so many Steinways that an annual advertising budget of $25,000 was increased to $500,000 in a few short years.

. . . *with Creativity*

Advertising, with creativity now an agent function, was fast becoming appreciated as a *powerful communicative force* that could move people by mixing fun and feeling with facts, figures, and product information. One of the earliest examples was N. W. Ayer's campaign for Uneeda Biscuit. National Buscuit Company put the bulk cracker barrel business out of business almost over-night by conceiving the 5-cent sealed, sanitary, home package of crackers. They had the idea and their agency put it across. The agency supplied the trade-name "Uneeda," and the Boy-in-Boots trademark. It recommended and bought space in newspapers, magazines, streetcar cards, posters, and paint boards. National Biscuit had to build bakeries all over the country to supply the fantastic demand. Everybody benefited — the client, media, the agency, but most of all the public who were introduced to a genuinely better product.

Consider, if you will, the advertising man who first realized the full power and potential which existed in advertising if he could, in fact, mix fun and feeling, facts and figures, and product information. He immediately had to pose these questions:

What does the consumer consider as *fun?*

Just *how* does a consumer *feel?*

How can I learn the *true* facts and figures about my client's markets and the media which will best reach those markets?

What do I need to know about the client's *products* to properly present them through advertising?

How can I *transmit* all that information to all these people I now have working for me?

It may very well be that someone also asked, at this point, "How did I get mixed up in all this when I had such a good thing going in the simple, uninvolved, and profitable peddling of space?" As agencies thought the problem through, they realized that competition was at work and that if they wanted to stay in business, they had to find answers to these questions. Systems and procedures had to be developed which would transform a lot of odd jobs into a fully and smoothly functioning advertising agency. But here it was that the very nature of the advertising business proved to be a major stumbling block.

An agency has no factories, no production lines that can be automated or systematized. An agency is people: thinkers, idea getters, opinion holders, self-determining individuals. An agency's product is not a physical, mechanical thing that works or doesn't work. In such a business "systems and procedures" sounded to many like stifling restrictions. "You can't mechanize creative work," cried artists and writers. "My judgment and experience are better than all your facts and figures," growled clients.

Of course, all these comments missed the point entirely. Progressive agency management realized, however, that efficient organization and better communication were vital if the business was to grow. Their task was a delicate one. It had to be carried on with care so as not to ruffle the feathers of sensitive employees or of dubious clients.

So where are we today? For the past 50 years, advertising agency growth and development have been largely a refinement and expansion of each of the functions of the agency as they had evolved by 1900.

. . . and Extra Services

Let us consider research. Although this service started as intuition in people otherwise employed, it came to be represented by separate, specially trained people, and eventually by fully staffed research departments. Today, marketing and research people are experts in digging up facts, and in taking difficult questions and turning them into useful, positive recommendations for the agency and its clients.

Merchandising started as another *extra* service and was often a sideline for print writers and artists. Here is where the desire, planted in the consumer's mind through advertising, is cultivated and made to produce at the point of sale. Merchandising has become another fully staffed specialty. My company's merchandising people alone handle almost six hundred different assignments every year ranging from direct mail pieces to complete sales training and sales promotion programs.

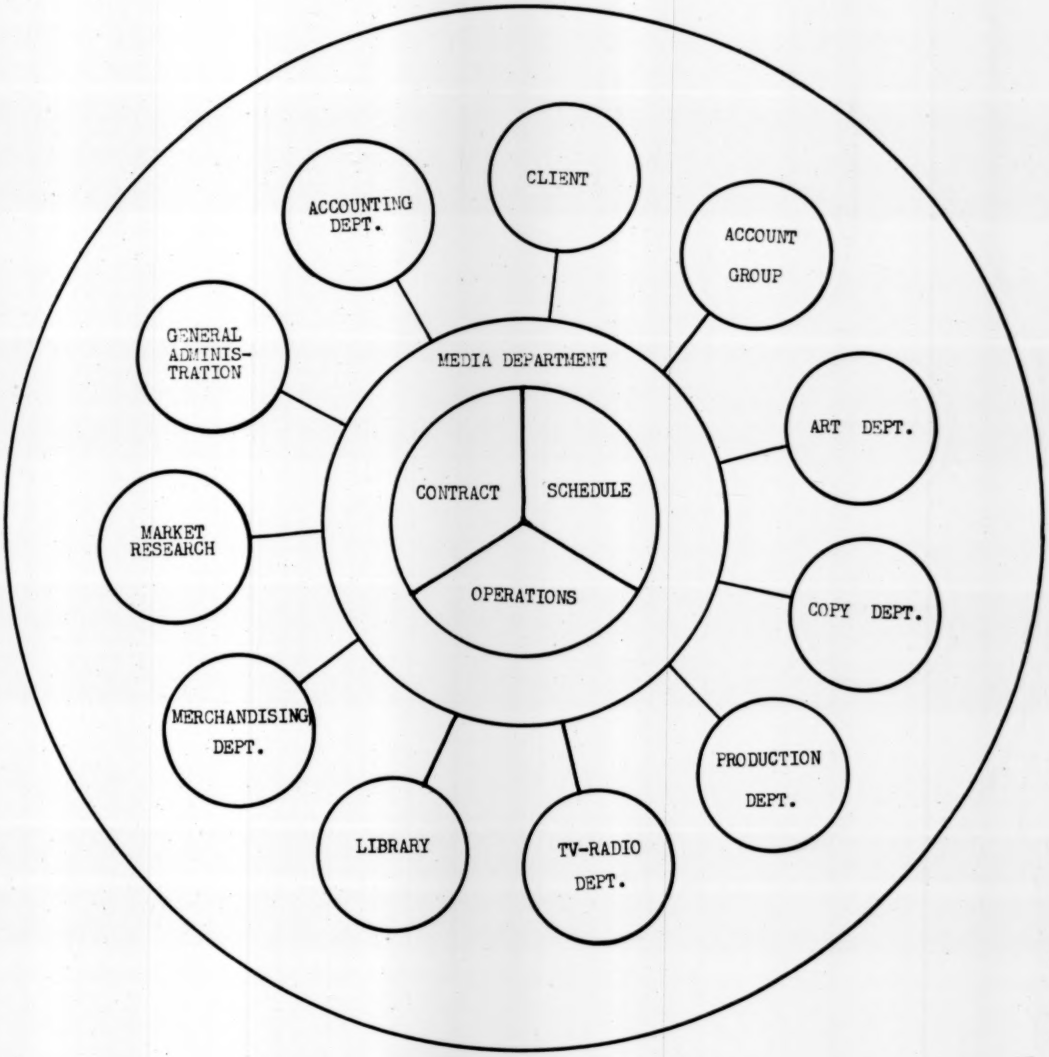
A whole new breed of creative people was taken on by agencies to write radio commercials and produce television commercials. These media today account for a significant portion of the advertising expenditures of many clients. More and more capable people are devoted to the serving of these needs. And, of course, the artists and copy writers who were first on the scene are still with us in greater numbers than ever, exercising greater talent and taking home bigger pay checks.

We can put many specialists in media to work on client objectives. These are the descendants of the original space brokers, but their activities today encompass many more and greatly expanded vehicles of communication. In public relations and publicity, we can help our clients prepare press releases to announce new products, new plans, and down-the-road developments. These releases can be keyed to over-all objectives so that free editorial space can work with the advertising. We have a review board that takes a good last look at every one of our marketing center recommendations in terms of client objectives. It is made up of department heads and top executives representing the several segments of the marketing center.

. . . Collectively Applied

And finally, we come to our production department. This is our last chance to see that we are giving the client the most for his money, and that the finished product comes out looking as it should.

What is really new and significant about all this is the way in which the talents of all these specialists are *collectively* applied to a client's total marketing problem. For, although described as separate functions, they in reality work as a team. It should be obvious to systems men that a fabulous network of intramural communication and organization is required to bring this about with any degree of efficiency or effectiveness. The departments that coordinate this network


CLIENT
ACCOUNTING DEPT.
ACCOUNT GROUP
GENERAL ADMINIS-TRATION
MEDIA DEPARTMENT
ART DEPT.
CONTRACT
SCHEDULE
MARKET RESEARCH
OPERATIONS
COPY DEPT.
MERCHANDISING DEPT.
PRODUCTION DEPT.
LIBRARY
TV-RADIO DEPT.

MODERN MARKETING CENTER

Figure 1

of communications are sometimes referred to as the "paper-work or red-tape people." This should be corrected! Paper work is in reality composed of systems of information handling and processing.

In my company, for example, our accounting and scheduling department employs more than one hundred people to issue and check invoices, pay bills. and keep suppliers and media happy. During an *average* month this department handles 13,000 supplier invoices and 8,200 outdoor posting and paint schedules. It writes 7,450 checks and breezes through 7,000 newspaper insertion orders. In periods of intense activity these figures can almost be doubled! We have an invoice control department concerned solely with the purchases of our art department. The artists call it "a little bit of Heaven," for this department has removed all the bewildering business detail from their creative heads. It handles the purchasing of hundreds of thousands of dollars worth of art work, lettering, photographs, photostats, and the like every year.

Another marvel of information handling systems is the traffic department. A cardinal sin in the agency business is to miss an insertion and the job of the traffic manager on each account is to make sure that deadlines are met, that advertising material is completed, and that it goes out before media closing dates. As you can imagine, anyone who can get copy, art, client, and the account group to agree on an ad by a certain date deserves a medal. Traffic does this, relying heavily upon that thing called "paper work."

Here, then is a chart showing how the modern marketing center might be pictured as a whole*. It is quite an outgrowth from the simple beginnings described at the beginning of this article. Note particularly, that this chart is a *circle,* not the usual organization chart with departments dangling at the end of long extended lines. In a marketing center all departments must be closely inter-related and, therefore, the lines of communication between those departments should be as short as possible — as they are here. However, it must be admitted that the efficient operation represented by this organizational wheel is an ideal yet to be fully achieved. And this is where our newest and perhaps most significant department comes into the story. It is our Data Processing Applications Department.

They Have System

We planned this new department for a long time, studying our information handling and coordinating systems to see how we could best make use of a battery of electronic machines. This department has just one objective: to shorten, facilitate, and better organize the communications — the systems of paper work — of our business. We know that *they* "growed like Topsy" throughout our own history and that in many ways they "growed" fat and lazy. When the department is in full and effective operation, we hope to be able to make our circular organization chart a reality and thus provide our clients with market, media, and consumer data at the same time that we handle our own internal data and communications with far greater speed, flexibility, and accuracy.

There is one group of agency people which has not yet been mentioned. This is the service management department as it is known at Campbell-Ewald. The people of this department are more popularly known as account executives and account supervisors. It might well be asked at this point: What is possibly left for these people to do? The account man has two major concerns: (1) Make sure that the service given our clients is as complete and excellent as possible and that every dollar we spend of the client's money earns maximum results and returns. (2) Make sure that while we do this we also provide for the agency a little profit incentive.

I may be a babe in the woods when it comes to *the details* of administrative systems work, but as an account executive, I've become a Solomon in recognizing the importance to *my job* of its continuing and more effective application. I will, therefore, be a champion of the cause but as a *recent* convert, I have this to say:

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*Figure 1, Page 31.

Are there not a lot of people among the employees of your companies who do not understand the scope and significance of your work? In your companies, the nature of the business may not generate the highly vocal dissenters that advertising has known. But is it not likely that there exists an equal lack of knowledge and appreciation of the contributions which systems work is making towards employee welfare *today* and can continue to make in the future? If my assumption is correct, management in this area has an educational job to do. It ought to be tackled vigorously.

. . . and an Image

In marketing and advertising, we are much concerned with images, that is, how a product or a company stands with a consumer. An image can be good, bad, or negative. The occupation of systems work has an image, too. I did not ask our research people to find out what it is, but just to bring it to your attention, I'll make an educated guess from my own experience. It is probably neither good nor bad — just negative. That is, if you conducted a survey among people or employees outside your own sphere of activity and asked what systems work meant to them, the answer would probably be "don't know." This surmise may be wrong. And that's the point. You ought to find out just where you stand. It is important that you do, because your work and its progress is vital to the continued development of our national economy, and this can be substantiated.

We all know that the country's population is growing rapidly. As it grows, the production and movement of goods and services must be greatly accelerated just to keep pace with the needs and desires of this population. And yet, the age group of 25 to 45 — *our prime work force* — will be proportionately and actually *down* in numbers by 1965. From where, then, is the expanded production and distribution going to come? Automation must fill some of the gap. It must be developed and utilized to a far greater extent than today.

Your thoughts are probably way ahead of my words, but from the outside looking in, I must share the excitement of a discovery I have made. It is simply this: If automation is a "must" for greater production, then mass communication is a "must" for expanded distribution. And that is the job of advertising! Vital to any or all of this is *information* and *organization.* The volume of data and reports required by business management will be astronomical. To be usable or workable it must also be quickly available and accurate. That is the job of systems men!

How strange it is that cybernetics and operational research have been to me no more than queer words to which I gave little thought or concern. And all the time, the practitioners of these management sciences have actually been my brothers-under-the-skin. How is it that I have not known them until now?

. . . Do We?

It is not right for advertising people to be considered as Madison Avenue "glamour boys." At the other end of the pole, you must not be thought of as "egg-heads," "red-tape artists," or, even worse, remain relatively unknown or unappreciated. These attitudes — or images — are erroneous roadblocks in the way of the progress that must be made if we are to do the job that needs to be done. We are working on our image. We ought to make out because, after all, this is one of the things we are in business to do. But how about you? Are you working on your image? **s/p/a**

S&P Book Reviews

Improving Managerial Performance, *by Virgil K. Rowland, Harper & Brothers, New York, 185 pp., 1958, $3.50.*

"The purpose of this book is threefold: (1) to stimulate the individual manager; (2) to assist the top manager in the direction of his subordinates; and (3) to amplify and, by example, illustrate a line-staff relationship that will aid the line organization to do its own managerial job," states the author in the preface. The book does accomplish its purpose.

Every page in the book contains an important statement or contribution toward better management. Any supervisor — up to top management — would find this book full of good practical ideas.

To listen to Mr. Rowland lecture on "Improving Managerial Performance" is inspiring. But next best is to read his ideas and philosophy on this subject. In Part I of the book, the Author presents "a Philosophy of Management Development." The objective of this approach is (a) to improve the performance of managers, as managers, and (b) to provide a reservoir of executives capable of assuming greater responsibilities when new opportunities arise.

Part II of the book covers the Appraisal, the Review, and the Interview in analyzing and developing managerial personnel. The technique is relatively simple and easy to adapt. Basically, it calls for managers to define their own functions and responsibilities and then establish the means for appraising them.

The author covers various methods for developing and selecting supervisory and management personnel in Part III. The training and selection techniques are tied in with the appraisal developed for each position. The over-all philosophy of management development is finally embodied in a "Standard" or write-up referred to as "Standards of Performance." *(Reviewed by Victor Lazzaro.)*

Elementary Mathematical Programming, *by Robert W. Metzger, General Motors Institute. John Wiley & Sons, Inc., New York, 1958, $5.95.*

The objective of this book was to transmit the essential ideas of linear programming to people of limited mathematical background. This aim is remarkably well achieved, though the reader should not expect his tour through the book to be effortless. The job is possible for those of ordinary attainment but is *not* a snap. The methods used are arithmetical and algebraic and are well and clearly explained. A fair recollection of elementary algebra is required and the notation employed in some instances requires some mathematical sophistication for ready comprehension.

Elementary Mathematical Programming should be read with paper and pencil at hand and with a willingness to work out some numerical examples. The reader who will take this approach and spend 30 to 40 hours on the book will emerge with an excellent working grasp of the principle and practice of linear programming. While many illustrative examples are completely worked out for the reader, the book would have been improved by the inclusion of several unworked problems per chapter to enable the diligent student to fix the methods in his mind without forcing him to invent his own examples. However, the illustrative problems are of a practical nature that will be readily understood by industrial students. Included are simple problems of product distribution, production scheduling, product mix for best profit, optimum stock cutting, and job and salary evaluation.

The methods include the complex but always effective "Simplex Method" and a number of special methods for particular types of problems and for producing approximate solutions. Mr. Metzger does an excellent job of explaining the utility and justification of approximate solutions.

One effective way to use the book would be to work through it to develop the ability to recognize the class of problems solvable through linear programming. Then locate such a problem of modest complexity from the real world. Scan the book by locating the examples most closely related to the real problem, and select the appropriate method. Solve the problem by applying the truly excellent step-by-step instructions which Metzger has organized. A few repetitions of this process will produce facility in technique and a surprising intuitive grasp of principles involved.

No theorems or proofs are included in the text, though footnotes and the comprehensive bibliography in the appendix will lead the reader who desires it to as much of the mathematical foundation of mathematical programming as he may desire.

Mr. Metzger has prepared an outstanding work book which will do much to dispel the awe and mystery which surrounds the techniques he discusses. To my mind *Elementary Mathematical Programming* deserves a place on the bookshelf of the forward looking systems man, as well as that of the applied mathematician. *(Reviewed by James E. Myers, Manager, Methods & Procedures Division, Burroughs Corporation.)*

Selecting, Planning, and Managing Office Space, *by Beryl Robichaud. McGraw-Hill Book Co., 361 pp., 1958, $8.50.*

The title of the book sounds quite all-inclusive,, and the reader is forced to admit that the contents really cover this broad subject. The book ranges all the way from a discussion of what factors to consider in determining whether to build or lease office space to suggestions about how often floors should be waxed and windows washed. The author of the present book has the material well organized; the subject is treated exhaustively. The book is one in a NOMA series on office management.

If there is one criticism one might make, it is that the book is a little too detailed and repetitive in certain sections. Most readers will probably be tempted to skim many sections rather than read them in detail. However, the author aids them in this by an outline presentation and frequent use of subtitles and bold face type as well as an extensive index. All of these make it possible to use the book as a reference volume.

The book is divided into four major sections:

1. Selection of Location and Building for the Office
2. Determining Space Requirements and Planning the Office Interior
3. Furnishing and Decorating the Office
4. Management of Office Space

The author discusses typical leasehold contracts, how to determine what you are getting, and what types of alterations the landlord can be expected to pay for. The relative merits of downtown or suburban locations are described and different types of building materials, office furnishings, and decorative schemes are discussed in detail. The book is also richly illustrated with photographs showing various types of office furniture, office partitions, and decorations. These illustrations alone make the book a valuable source of ideas.

The author excludes the subject of office machines though touches upon such related aspects of the problem as soundproofing and ventilation around noisy machines.

It will be gratifying to systems people that the author emphasizes that systems people should play an important part in the space planning function, utilizing such tools as work flow analysis and organizational planning.

Summary: The book is excellent and can be read with profit by several levels of management. The author's name might well become a household word among people concerned with space planning — except for the fact that most of them probably will have trouble with the pronunciation. *(Reviewed by Joseph Rasmussen, Argus Division of Sylvania Electric Products, Inc.)*

Efficiency in Government through Systems Analysis, *by Roland N. McKean, John Wiley & Sons, Inc., New York, 336 pp., 1958, $8.00.*

How can a decision-maker determine the one best course of action from a series of alternatives during a particular moment? This is the general theme of the book. The author answers this question in his book by discussing in detail certain analytical methods available to the systems analyst seeking facts *for* the decision-maker. These methods have universal application, in both business and in government.

Certain methods must be used with caution. The cost-ratio concept must be applied with particular care. The selection of a course of action cannot be made simply by finding a solution which offers maximum gains at minimum costs. Spill-over, intangibles, and uncertainties must also be considered. The selection must be made within budget limitations. As the author points out, " . . . the relationship between the estimates of gain and cost cannot reveal the preferred policy." The real solution exists somewhere between the two limits, based on taking into consideration all of the outside factors concerned.

Chapter 4 treats in an interesting and informative manner the subject of determining the values of intangibles and uncertainties. These subjects are generally problems to the systems analyst. The author urges analysts "to avoid concealment and to present some quantitative indicators" when dealing with intangibles and uncertainties. He offers methods to achieve this.

Expectant readers from the business world should not be misled by the book's title. Although the author mentions government and water-resources as part of the book's title, the contents discuss analytical methods which are universal in scope and application. Two government case studies of water resources serve only as props for the application of analytical methods.

Management analysts and budget examiners in government will find Chapter 13 of interest for its application of performance budgeting to the governmental function. Chapter 14 explores new opportunities for application of analytical methods to other governmental activities. Certain qualitative tools are suggested which can serve to supplement the aims of the Hoover Commission findings on ways to improve government efficiency.

For the skimmer, Chapter 6 sums up the basic principles discussed in the book. Chapters 1 to 5 deal with the development of these analytical methods and their basic theory. Chapters 7 to 13 deal with their general application. *(Reviewed by Maurice F. Ronayne, Chief, Procedures & Methods, U. S. Federal Mediation & Conciliation Service.)*

Business Electronics Reference Guide, *Volume 4, edited by Peggy Courtney, Controllership Foundation, Inc., Two Park Avenue, New York 16, 602 pp., 1958, $15.00; member $10.00.*

A monumental reference guide to electronic data processing has been prepared by the Controllers Institute of America. This reference work describes 383 company and governmental installations, including equipment and applications, and reports on 34 American and foreign digital computers commercially available for business applications.

The *Guide* gives a list of 71 commercial computing centers with electronic digital computers available on a fee or rental basis. Other sections cover training programs and courses scheduled by 44 organizations, visual presentations, periodicals, books and an invaluable topical index to published material and descriptions of subscriptions services.

This volume is the definitive reference guide to electronic data processing. Limited to this purpose it becomes a *must* to anyone who works daily with electronic data processing. *(Reviewed by Thomas G. Rizzo, New York Life Insurance Co.)*

Corporate Records Retention, *Volume 1, Controllership Foundation, Inc., New York, 242 pp., 1958, $10.00.*

This book is the first in a series of three guides to be published by the Controllership Foundation, Inc., on records retention. The first volume covers the legal requirements of the United States Federal Government and its agencies relating to records retention and limitation periods for action. Specific schedules and limitation requirements can be easily located in the book, and are presented in a concise manner.

There are 27 sections in the book, each of which covers excerpts from statutes and regulations bearing on record keeping requirements. The sections cover various categories and industries under broad titles such as Taxation, Labor, Banking, Aircraft, and Drug.

It is an excellent source and guide for ascertaining the retention schedule of records without extensive research. Anyone with this responsibility will find this book worth having. *(Reviewed by Victor Lazzaro.)*

An Introduction to Automatic Computors, *by Ned Chapin, D. Van Nostrand Co. (Can.) Ltd., Toronto; 525 pp., $7.50.*

This book makes a worthwhile attempt to gather in one volume much of the data relevant to electronic computers. Following a recent trend, the author deals with such subjects as the concept of computers, their background and development, installation costs and problems, operating costs, characteristics, and other matters. In short, much knowledge of a worthwhile nature is gathered.

Of particular interest, the author, a systems analyst with Stanford Research Institute, attempts to assess the auditor's responsibility where electronic computers are used for work processing. While there might be differing opinions as to whether auditors should investigate the means of preparing "computer input" and express an opinion as to "whether a program establishes a logical and acceptable relationship between the input and output of a computer," at least an auditor is given to realize that fresh techniques will be demanded of him and that present audit routines will not suffice where a computer installation replaces conventional equipment.

The four pages devoted to an auditor's responsibilities are stimulating and should provoke thinking as to new audit concepts. "Suggested readings" at the conclusion of each chapter and Appendices dealing with commercially available computers and punched card equipment increase the usefulness of this volume to the lay reader.

Unfortunately, due to rapid developments certain sections are already outdated. This, however, is inevitable and for the next few years books on "Automatic Computers" will have a short life due to the introduction of new techniques and equipment. Chapters on basic principles, background and the summary of problems experienced by the pioneers in this field will have a continuing value however. *(Reviewed by G. H. Cowperthwaite, C.A., Toronto.)* **s/p/a**

Worth Reading

"Using IDP for Inventory Control," Frank H. Muns, *The Controller,* February, 1959.

Describes Westinghouse Electric's (Pittsburgh) inventory system. Over 5,000 items stored in four different cities are available through IDP to 20 regional sales offices. About 4,000 customers are involved. Equipment consists of: paper tape units in the 20 sales offices; leased wire transmission between sales offices, warehouses and the central processing unit; and a RAMAC. The system provides for invoices from order data input, inventory location, and replenishment feedback, and shipping documents prepared as part of the process. Three years were required to develop the system.

"Growing Role of the Company Economist," Clark S. Teitsworth, *Harvard Business Review,* January-February, 1959.

It is the economist who appears to be the best fitted to help management blaze the trail to greater stability. The economist keeps most informed of general business trends and developments; he must be independent of any top-management group so that he may advise frankly when asked.

"The Reach of an Executive," Stahrl Edmunds, *Harvard Business Review,* January-February, 1959, p. 87.

Both large and small companies can afford to operate an effective reporting system for decision making. Its primary requirements are:

1. The essential actions in the business should be measured as they take place.
2. Goals and time limits should be set which these essential actions are to meet.
3. One or more analytical minded people should be appointed to determine where and why the actions are falling short of their goals.
4. Managers should listen to what the information system has to tell them about where problems are developing.

"How to Re-organize for Best Use of Systems Staff and Machines," Richard A. Gilbert, *Management Methods,* January, 1959.

Describes McDonnell Aircraft's (25,000 employees) systems program using 77 people and an IBM 705. The program was developed by:

1. Establishing a central systems function
2. Combining corporate systems, computer planning and programming, and data processing into the central department
3. Establishing a separate systems function in eight operating divisions (engineering, manufacturing, personnel, etc.)
4. Fostering strong relationships between the central and divisional groups

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"Some Limitations on Operations Research," by George S. Odiorne, *Michigan Business Review,* January, 1959, pp. 3-10.

Because Operations Research is being used successfully in such specific technical areas as marketing, production planning, market research, quality control, and product mix, it is an easy step to generalize that it can easily be adapted to a general system of management. But, man is not a fact and accordingly cannot be reduced to a number.

"How to Cut Office Costs With Performance Standards," Herman Limberg, *Management Methods,* February, 1959.

Cursory treatment of the steps in a work measurement program. Illustrated with seven forms to be used in a program, starting with Work Description and ending with an Effectiveness Report.

"Gear Accounting to Shipping Speeds," *Modern Office Procedures,* January, 1959.

General description of a punched card system used by an auto part supplier. About 50,000 different customers order from a stock list of 30,000 parts. A file of 750,000 cards, with pre-punched prices, is used with pre-punched customer cards. Orders average 13 items each.

"New Copy System Speeds Work Flow and Reduces Errors," *American Business,* January, 1959.

Brief statement of experience with Xerox Copyflow by Aviation Gas Turbine Division of Westinghouse. Claims offset masters are now prepared for 9 cents instead of 40 cents and that 100,000 documents are copied monthly for 3 cents each, including all costs.

Publishers:

1. *American Business,* Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40.
2. *The Controller,* Journal of the Controllers Institute of America, 1 East 42nd St., New York 17.
3. *Harvard Business Review,* Graduate School of Business Administration, Harvard University, Soldiers Field, Boston 63, Mass.
4. *Management Methods,* Management Magazines, Inc., 141 E. 44th St., New York 17.
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s/p/a

Talking The Same Language

Ineditorial

▶ One of the great ironies of the American business scene is the inability of the various segments of an industrial organization to meet together, talk the same language, and think the same concepts. Accountants can meet with accountants anywhere in the country and understand each other's problems and lingo. The jargon of an engineer from Pocatello is perfectly intelligible to his counterpart in Sandusky. Throw some purchasing agents together from various types of businesses and they'll be able to sympathize with each other quite readily in their mutual problems.

But meet with representatives from each department of an average organization, and you find more than likely something akin to a modern Tower of Babel. They'll bring differing concepts of purpose and method, a deep-set inclination to equate each activity in terms of local effects, and a resistance to any kind of integration which might reflect upon the sanctity of their provincial departmental lairs and penates. Too seldom are they willing to learn what the other fellow does and how they can join in a common effort to simplify processing, reduce costs, speed the flow, and make the whole business cycle operate more effectively.

In an ideal situation, the engineer would design an item in the same way production would build it, the planner would order a part in the same way the buyer would buy it, and the buyer would buy it in the same way the vendor would invoice it. But very few companies have approached these ideals.

Despite the powerful motivation of IDP in leveling fences among departments, there are still many "standpatters" unwilling to see the handwriting on the wall. These people believe they are serving the company best by trying to mold the operation of all departments to their own image. Their days are numbered — but some will have to be dragged kicking and screaming into that future business utopia where someday we'll find accountants, engineers, buyers, and planners who talk the same language.

The role of the systems man in this effort is patent. He is by the nature of his calling a great leveler and a great unifier. He has to understand all concepts and all idioms, to seek a concordance of ideas, and to translate all dialects into a common language having the widest latitude of comprehension. Getting people to talk the same language isn't the easiest job in the world, but it has a tremendous potential of advantage to the business world. (Gibbs Myers, Northern New Jersey Chapter).

s/p/a

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